

Amendment to the Claims:

This listing of claims will replace all prior versions, and listings, of the claims in the application.

Listing of Claims:

Claim 1 (currently amended): A process for conducting a- an endothermic chemical reaction which has a gas phase reactant and a gas phase product, while performing separations by pressure swing adsorption of the product component from the reactant component over an adsorbent material on which one of the reactant and the product components is a more readily adsorbed component and the other is a less readily adsorbed component under increase of pressure, the process including the steps of:

- (a) introducing a feed gas containing the reactant component to a reaction space,
- (b) conducting the reaction within the reaction space so as to obtain a gas mixture containing the reactant and the product components
- (c) contacting the gas mixture containing the reactant and the product components with the adsorbent material in flow paths extending between first and second valve faces in a rotor,
- (d) supplying gas to the first or second valve face to achieve an upper pressure of the process,
- (e) withdrawing gas from the first or second valve face to achieve a lower pressure of the process, and
- (f) rotating the rotor at a rotational speed so as to establish cyclic fluid communication for each of the flow paths through the first and the second valve faces in a cyclic sequence, so as to establish flow in each flow path directed from the first valve face to the second valve face at substantially the upper pressure,

and to establish flow in each flow path directed from the second valve face to the first valve face at substantially the lower pressure; and

(g) contacting a purge gas stream with the adsorbent material in the flow paths wherein the purge gas stream includes oxygen so as to provide heat in the flow paths by catalytic combustion of a reactant component.

Claim 2 (original): The process of claim 1, in which the reactant component is the less readily adsorbed component, and withdrawing a product enriched in the more readily adsorbed component from adjacent the first valve face.

Claim 3 (original): The process of claim 2, further withdrawing gas enriched in the more readily adsorbed component from the first valve face, compressing that gas to an increased pressure, and refluxing the gas to the first valve face and thence the flow paths at the increased pressure, so as to increase the concentration of the more readily adsorbed component adjacent the first valve face.

Claims 4-15 (canceled).

Claim 16 (original): The process of claim 1, further maintaining the temperature of the flow path adjacent the first valve face approximately at a first temperature, and maintaining the temperature of the flow path adjacent the second valve face approximately at a second temperature.

Claim 17 (original): The process of claim 1, maintaining the first temperature to be greater than the second temperature, and exchanging heat between the gas mixture in the flow paths and solid material with heat capacity disposed along the flow paths.

Claim 18 (original): The process of claim 1, maintaining the second temperature to be greater than the first temperature, and exchanging heat between the gas mixture in the flow paths and solid material with heat capacity disposed along the flow paths.

Claim 19 (original): The process of claim 1, further conducting the reaction within the flow paths, a portion of each of which being a reaction space.

Claim 20 (original): The process of claim 1, further comprising the step of conducting heat between extended heat transfer surfaces in the rotor and the flow paths intermediately between the first and second valve faces.

Claim 21 (currently amended): The process of claim ~~12~~ 1, further comprising the step of conducting heat to the flow paths from a heat transfer fluid externally contacting heat exchange surfaces in the rotor.

Claim 22 (canceled).

Claim 23 (currently amended): The process of claim ~~12~~ 1, wherein the reactant component comprises a first component which is a hydrocarbon, ~~such as methane~~, and a second component, comprising steam, and wherein the product component comprises a strongly adsorbed component, which is carbon dioxide, and a component, which is hydrogen, and wherein the adsorbent material is selective for carbon dioxide in the presence of steam at elevated temperature.

Claim 24 (original): The process of claim 23 further comprising the step of providing a nickel catalyst in the flow paths.

Claim 25 (original): The process of claim 23 further comprising the step of providing a platinum group catalyst in the flow paths.

Claim 26 (original): The process of claim 23 in which the first and second reactant components are introduced to the first valve face at substantially the upper pressure while hydrogen is delivered from the second valve face, and carbon dioxide is delivered from the first valve face at substantially the lower pressure.

Claim 27 (original): The process of claim 24 in which steam is admitted to the second valve face at substantially the lower pressure so as to assist purge.

Claim 28 (original): The process of claim 23 in which air or oxygen is admitted to the second valve face at substantially the lower pressure so as to assist purge while providing heat to the flow paths for the endothermic reaction.

Claims 29-68 (canceled).